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THE WOLF SPIDERS OF AUSTRALIA (ARANEAE: LYCOSIDAE): 9. *PARDOSA SERRATA* (L. KOCH 1877)

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ABSTRACT

A redescription of *Pardosa serrata* (L. Koch) is provided with notes on the life history, habitat, and burrow.

The Australian species of the genus *Pardosa* are inadequately known, and compared to other continents, Australia has very few described species (McKay 1973, p. 378). A revision of the Australian species would be most desirable, but at present insufficient material is available to make this possible, and it appears likely that most Australian species placed in the genus *Pardosa* may be accommodated in other genera. I have followed Simon (1909) in assigning *Lycosa serrata* L. Koch to *Pardosa*, despite the fact that the labium is equal to or only slightly wider than its length, and the combined length of the tibia and patella of the fourth leg is greater than the length of the corresponding metatarsus, due to the similarity of the male palp with those of the better known Holarctic species of the genus *Pardosa*.

Pardosa serrata (L. Koch 1877) (Fig. 1A–F, 2A–D)

Lycosa serrata L. Koch, 1877, pp. 930–2, pl. 80, Figs. 5, 5a, 6, 6a, Sydney, New South Wales; Rainbow, 1911, p. 272; Mascord, 1970, p. 106, pl. 49, Nos. 193, 194; Main, 1976, pp. 142–3.

Pardosa praevelox Simon, 1909, pp. 191–2, Station 114, Buckland Hill near North Fremantle, Western Australia.

Geolycosa serrata, Roewer, 1954, p. 243; McKay, 1973, p. 380.

Material Examined

Holotypes: *Lycosa serrata* L. Koch: Location of holotype unknown. *Pardosa praevelox* Simon: Location of holotype unknown.

Other Material

Western Australia: Attadale, 5.v.1959, A. R. Main, WAM 68–515, 26.ii.1960, W. Lane, WAM 68–964–990, 22.i.1960, W. Lane, 68–991–1000, 13.viii.1960, W. Lane, WAM 68–1001–1007, 11.vi.1960, W. Lane, WAM 69–1008–1–11, 22.i.1960, BYM, WAM 68–1012–1050, 25.v.1966, W. Lane, WAM 68–1051–1056, 5.v.1959, A. R. Main, WAM 69–99, 1.iv.1960, BYM, W. Lane, WAM 69–368–375, 1.iv.1960, W. Lane, WAM 69–376–384, 13.xii.1960, W. Lane, WAM 69–385–393, 23.iii.1960, W. Lane, WAM 69–401, 5.viii, 1960, W. Lane, WAM 69–402; Balga, 4.iv.1973, G. W. Kendrick, WAM 73–221; Brentwood, 6.xii.1966, BYM, WAM 69–394–400, 23.iv.1969, RJM, WAM 69–672; Bullsbrook, 26.vii.1959, BYM, WAM 69–916; Burnabinmah Station, 25.v.1968, JG, WAM 69–819; Cape Freycinet, 25.i.1971, HB, WAM 71–786; Caversham, 26.vii.1952, BYM, QM S18; Cheyne Beach, Albany, at Bluff Creek, 27.v.1959, A. R. Main, WAM 68–516; Collie, 23.x.1960, BYM, WAM 71–1431; Coogee, 5.ix.1952, BYM, WAM 71–508; Cottesloe, 21.ix.1952, BYM, WAM 70–195–196; Cunaring Hill, south, 3.v.1959, BYM, WAM 68–514; Dianella, 15.iii.1973, L. D. Cooke, WAM 73–223; Fitzgerald River Reserve, 12.vii.1970, RJM, R. Prince, WAM 70–207, 13.vii.1970, RJM, WAM 71–5–10; Gingin, vii.1954, E. Lindgren, WAM 71–1433; Golden Bay, Mandurah, 21.i.1971, RJM, WAM 71–810; Goomalling area, 18.vi.1952, BYM, WAM 69–907, 17.vi.1952, BYM, WAM 70–194; Great Northern Highway near Yandanooka, vii.1957, BYM, HB, WAM 69–85; Harrismith east, 11.vi.1952, BYM, WAM 70–191; Hyden at The Humps, 20.vi.1952, BYM, WAM 71–1425–1427; Kingoonya 16 km SE., 1955, BYM, WAM 69–834; Kondinin 35 km E., 9.vi.1952, BYM, WAM 69–1030; Margaret River, xi.1931, Walleliff, MCZ Harvard; Murchison River at Gic Gic Camp, 2.xii.1968, RH, WAM 69–699–719; Narembeen, 8.vi.1952, BYM, WAM 69–908–910; Narrogin, 12.vi.1952, BYM, WAM 69–1011; Nedlands, iii.1952, BYM, WAM 69–913; North Irwin River, 14.vii.1968, L. V. Shields, WAM 71–901; Pingrup 27 km E. at Greenshields Soak, 30.iii.1970, T. Evans, WAM 71–1421; Point Peron at Lake Richmond, 14.iv.1968, RH, WAM 70–197; Reabold Hill, 20.iv.1969, M. Archer, E. Jeffreys, WAM 73–151; Red Hill Road, 12.x.1952, BYM, WAM 71–1026; Rossmoyne, 1.v.1969, RJM, WAM 69–881, 13.xi.1968, RJM, WAM 68–857, iii.1968, RJM, WAM 69–83–84, 4.iv.1971, RJM,

WAM 71–1847; Rottnest Island, viii.1956, A. R. Main, WAM 68–859, 5.iii.1959, RJM, WAM 69–453; Tammin, iv.1946, BYM, WAM 69–912, 12.vii.1952, BYM, WAM 69–914; 25.ii.1952, BYM, WAM 71–1027–28; Tarin Rock Reserve, 23.v.1971, A. Baynes, WAM 71–1428–30, 26.v.1971, WAM survey party, WAM 71–1432; Toolibin, 12.vi.1952, BYM, WAM 70–190; Triggs Island, 8.v.1971, Mr. Mellows, WAM 71–1423–24; Walebing south, 18.viii.1953, BYM, WAM 69–833; Wanneroo, 12.iv.1969, RH, WAM 69–831–832, 26.iv.1969 at Badgerup Swamp, RH, WAM 69–1038–39, WAM 71–393–394; Wilson near Canning River, 29.iv.1969, H. Lingius, WAM 69–882; Wongan Hills, 28.vi.1970, A. Baynes, WAM 70–189; Wubin 3 km south, 7.xii.1968, RJM, JG, WAM 69–790; Yalgoo, 29.vii.1957, HB, WAM 68–856; York 11 km W., 4.vii.1964, HB, WAM 68–858; Yorkrakine Rock, 12.vii.1952, BYM, WAN 9–911.

South Australia: Gawler Ranges at Kokotha Sands, 13.x.1976, D. C. Lee, 1 ♀M, SAM ARA 535; Moonarie Gap, Wilpena Pound Range at the flats east of the Gap, 22.viii.1970, W. D. L. Ride, HB, 2 ♀M, WAM 637–38.

New South Wales: Malabar, 16.ii.1966, R. Mascord, 3 ♀PIJ, A.M.

DESCRIPTION (after L. Koch 1877)

Female: Carapace dark red-brown with yellow-brown hair; a white lateral band divided in its posterior half by a longitudinal brown stripe; a white median longitudinal stripe, narrow at the posterior margin and broadening at the fovea to form three stripes on the cephalic part; the median stripe is broader than the lateral ones and reaches the PL eyes where it constricts into a fine white line which continues down the centre of the face to the AM eyes; the lateral stripes are wavy and terminate at the PL eyes; on each side of the face is a white diagonal stripe; mandibles dark red-brown, covered with yellow hair; maxillae and labium yellow-brown; sternum black-brown with yellow to white hair. Abdomen black-brown above, covered with yellow-white dots; at the base is a black longitudinal stripe, wider posteriorly, and forming serrations on either side with white borders; behind this serrated stripe and connected to it is a black longitudinal band reaching to the spinnerets and crossed throughout its length by white angular lines; on either side of this black band is a row of large white spots; sides of abdomen covered with yellow-white hair and black dots; ventral surface yellow-white. Legs reddish-brown with white hair; on the femora anteriorly, posteriorly, and above, a continuous black longitudinal stripe. Spinnerets yellow-brown, covered with grey-brown hair (Fig. 1A).

Anterior row of eyes straight; AM slightly larger. PM not large, barely larger than the PL eyes, and from these and each other, equidistant. Anterior row of eyes narrower than second row.

Male: Similar to female in coloration and pattern except for the posterior half of the longitudinal stripe on the abdomen which is more deeply serrated. The AM slightly further apart than from the AL.

VARIATION: Specimens from dark substrates are much darker in colour than those from pale or white beach sands. Three promarginal teeth on the chelicerae, the middle on largest; three retromarginal teeth of equal size. The eye diameters and interspaces of four specimens are given as a percent of the total width of the first row of eyes in Table 2. Measurements of leg segments of a male (WAM 71.1423, C.L. 7.0) given in Table 1.

The female epigynum is longer than broad with a scarcely evident median guide that does not join the broad inverted horseshoe-shaped terminal guide (Fig. 1E). Internal genitalia of a female from Caversham, W.A. illustrated in Figure 1F. The male palp (Figs. 1B, C, D, Triggs Island, W.A.) is very characteristic of the species, having a broad inverted horseshoe-shaped embolic guide and a short curved somewhat trough-shaped median apophysis situated over the membranous secondary conductor. See McKay (1974) p. 17, fig. 4, for terminology.

TABLE 1: MEASUREMENTS OF LEG SEGMENTS OF MATURE MALE *PARDOSA SERRATA* IN MM

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
1	6·1	2·3	5·8	6·1	2·9
2	6·0	2·3	5·2	6·1	3·1
3	5·9	2·2	4·9	6·5	3·4
4	7·9	2·4	6·7	8·8	4·1

TABLE 2: EYE DIAMETERS AND INTERSPACES OF *P. SERRATA* CONVERTED TO PERCENT OF THE TOTAL WIDTH OF THE FIRST ROW OF EYES

Regd No.	Sex	C.L.	AM	AL	PM	PL	AM:AM	AM:AL	PM:PM	AM:PM	AL:PM	CLYP
SAM ARA 535	♀M	7·2	20	18	51	41	17	8	33	18	14	29
WAM 68–857	♀M	7·9	21	19	45	38	12	6	40	14	14	24
QM. S18	♀M	7·2	22	17	42	35	13	8	40	16	16	24
WAM 71–1423	♂M	7·0	23	18	45	35	13	5	40	15	15	26

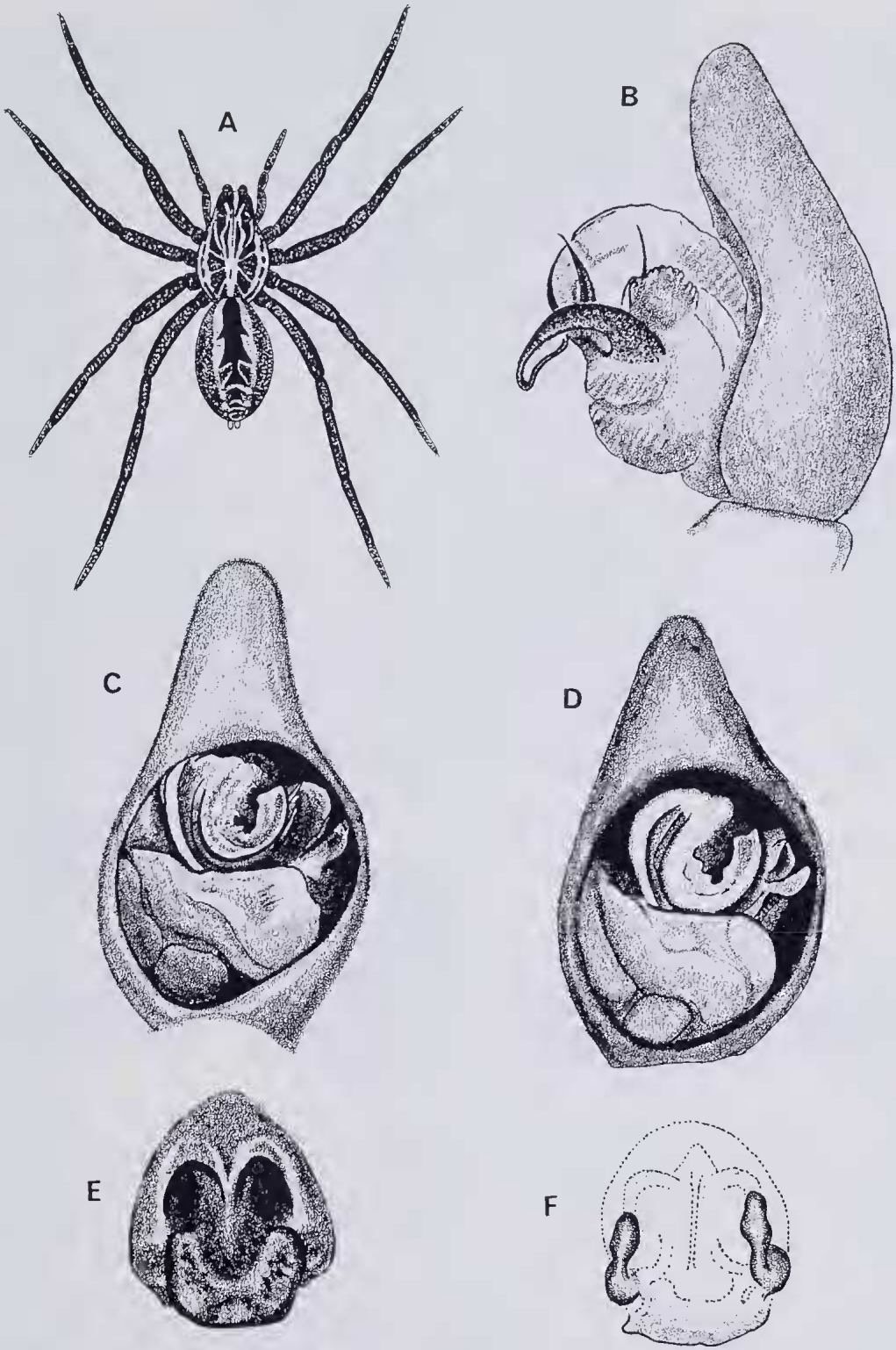

FIG. 1: *Pardosa serrata*. A, mature female; B, expanded male palpal organ of WAM 71–1423; C, male palpal organ of WAM 71–1424; D, male palpal organ of WAM 71–1423; E, epigynum of QM.S18; F, internal genitalia of QM.S.18.

SIZE RANGE: Mature females 3·3 to 7·7 mm. Mature males 3·6 to 6·6 mm.

DIAGNOSIS: This species is distinctive in coloration, the ventral surface of the abdomen is pale and the median longitudinal stripe on the cephalic part of the carapace is divided into three white stripes, the central one extending over the face to reach the first row of eyes. The female epigynum is of characteristic shape, as is the male palpal organ (see above).

LIFE HISTORY

Mature females may be found throughout the year. In Western Australia the mature males are found from early January to late May, and are most abundant during February to mid April. Copulation takes place on warm or humid nights, during late March to mid April. Mature males seeking females may be very numerous at night just prior to thunderstorms during March and April. The males die after mating, and if retained in the laboratory following copulation, they cease to feed, become uncoordinated, and rapidly die in a bout of frenzied activity once stimulated. Gravid females remain in the burrow and only leave to capture prey. The eggs are laid during mid July to early September and on warm sunny days females may be observed at the burrow entrance head downwards sunning the egg cocoon by turning it slowly with the last pair of legs. Females with egg-cocoons have been collected from mid July to early November and are most abundant during August. The young hatch during late August to November and are most common during September when females bearing young are to be collected from the burrow. By November no young remain with the female and many mature females are to be found in an emaciated condition, frequently dying, within the burrow. Some females persist throughout the summer months to copulate the following season. The juveniles may be found running during late September to late November and are most commonly observed following light rains. The juveniles dig burrows with the onset of summer and mature during February to March.

Pardosa serrata was found to be active in the burrow at ground temperatures of 12°C but below 10°C become comatose (observations during July 1970, Fitzgerald River, W.A.).

HABITAT

Although this species may be found on clay soils or lateritic gravels they are most abundant on sandy soils, especially coastal heathlands, and may on occasions be quite numerous on coastal interdune flats. Most specimens were collected from the Swan Coastal Plain, Western Australia, on leached sandy soils with a scrub vegetation of *Banksia, Xanthorrhoea* and *Melaleuca*. At the Fitzgerald River this species was most common on

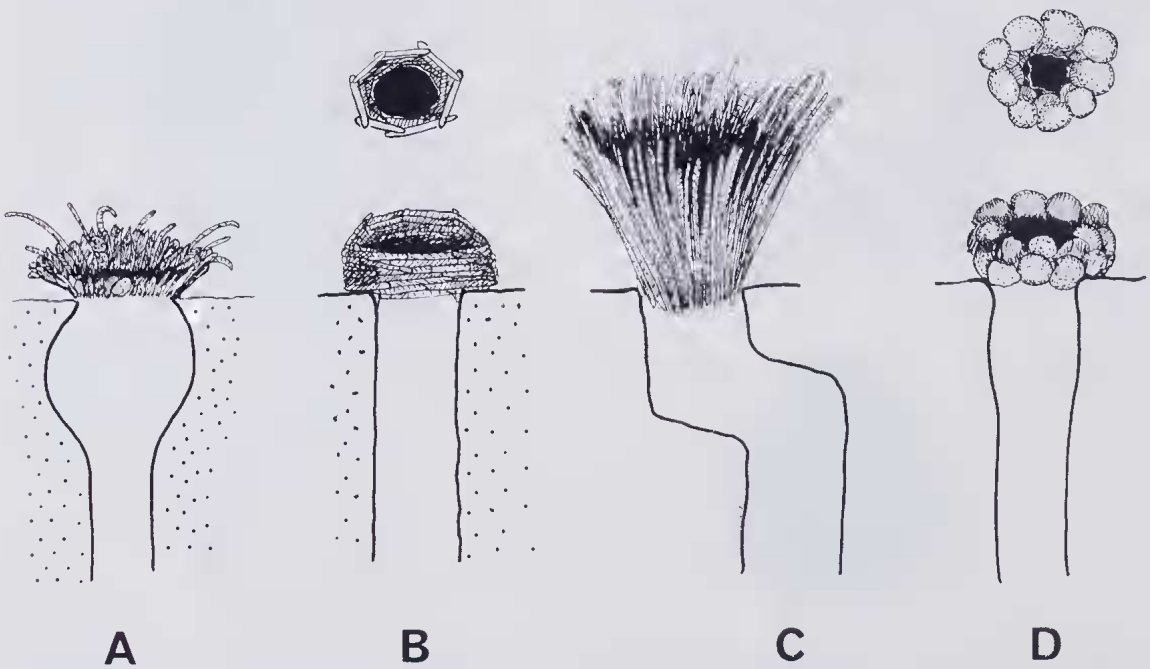

FIG. 2: Burrows of *Pardosa serrata*. A, collar type; B, log-cabin type; C, palisade type; D, pellet or turret type.

sandy soils bearing *Gahnia* clumps, and on the south west coast populations were frequently associated with Peppermint trees *Agonis flexuosa*.

Burrow

The burrow is invariably protected at the entrance by a turret or palisade constructed from a variety of materials. The burrow is usually vertical and descends to a depth of between 10 and 20 cm. Occasional burrows have an enlarged chamber below the entrance (Fig. 2A) or may have an abrupt bend some 4 cm below the surface (Fig. 2C).

The construction of the palisade varies according to available materials and the following types have been observed:

1. Collar type: A low collar of twigs, grass cuttings (on suburban lawns), grass seeds, or debris, bound together by silk (Fig. 2A).
2. Log-cabin type: elaborately constructed of short (5 to 10 mm) lengths of grass stem or twigs laid horizontally and overlapping to form a complete wall bound with silk (Fig. 2B).
3. Palisade type: a well constructed or loosely constructed wall of grass stems, *Acacia* or *Casuarina* litter arranged vertically as a tube or funnel (Fig. 2C).
4. Pellet or turret type: A wall of small *Eucalyptus* nuts, rabbit dung, or sheep pellets stacked on top of each other, and bound with silk (Fig. 2D).

At Fitzgerald River, W.A., the log cabin type and the palisade type of burrow were found to occur together. The log cabin type was constructed from short pieces of twig, with or without occasional small nuts, bound together to form a wall 2 to 3 cm high. One burrow was constructed by pulling long (5 to 6 cm) flexible grass stems around the entrance to form a bound circular wall; each strand was bound into place by silk, and in some sections reinforced by short pieces of grass or twig laid horizontally. The palisade type was constructed from grass stems arranged vertically to form a low funnel-like entrance some 3 to 5 cm high. Mature females were collected from both types of burrow.

Penultimate females retained under laboratory conditions within large glass jars part filled with sand were provided with a crude burrow formed by forcing a rod into the packed moist sand and various turret building materials. Both the palisade type (grass leaves) and the log cabin type (short pieces of grass stem and twig) were built by spiders collected from a dry suburban lawn at Rossmoyne near Perth, W.A.; the turrets were poor representatives of the elaborate palisades found in the field however. A study of these constructions under laboratory conditions using a variety of building materials would be a most interesting ethological experiment.

Most burrows were found in open flat areas where the turret or palisade may prevent sand from blowing in, or provide protection from predators or flash floods. The adaptive value of such elaborate structures have been little studied (see Gwynne and Watkiss 1975).

Discussion

This species is characterised by its distinct colour pattern and the structure of the male palp. The original description of *Pardosa praevelox* leaves little doubt that this nominal species is a junior subjective synonym of *Lycosa serrata* L. Koch. Mature males of the New South Wales and South Australian populations have not been collected since the species was originally described in 1877, but the illustration of the male palp by L. Koch (1877, pl. 80, fig. 5a) agrees fairly well with the palpal organs of Western Australian males. A detailed comparison of the male palpal organs from New South Wales and Western Australia is required.

Distribution

New South Wales, South Australia, and southwestern Western Australia.

LITERATURE CITED

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